COST AND MANAGEMENT

PROFIT

Productivity . . . How to be Realistic in its Measurement and its Improvement

By Allen W. Rucker

Decentralized Profit Planning and Control . . .

By W. E. Gordon

Costing For Decision Making . . .

By Leonard A. Cohn

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The Society of Industrial and Cost Accountants of Canada

March 1957

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Cost and Management

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PRODUCTIVITY—How To Be Realistic in Its Measurement and Its Improvement.

By Allen W. Rucker 97

Co-founder and President of the Eddy-Rucker-Nickels Company, Mr. Rucker has acted as business consultant to firms in the United States, Canada and various foreign countries, and is a member of the Advisory Committee on Productivity for Europe and the Mutual Security Administration. He has published several books and his articles on management control, productivity improvement and compensation plans have appeared in leading American and European business journals.

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Walter E. Gordon is Assistant Divisional Controller of the Windsor Manufacturing Division of the Ford Motor Company of Canada, Limited. Mr. Gordon is a graduate in commerce and finance from the University of Toronto.

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Leonard A. Cohn holds a B.S. degree in chemical engineering from Iowa State College and an M.B.A. from Washington University. Mr. Cohn is a Production supervisor for Monsanto Chemical Company, East Saint Louis, Illinois.

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Editorial Comment . . .

OPEN THE WINDOWS

The Bank of Canada in Ottawa is an imposing edifice, designed, no doubt, to impress the public with the wisdom and stability of the bank. But, we think, the public would be more permanently impressed if the blinds of the bank were raised occasionally so the public could see inside.

This is not a case of Peeping Tom. It is a matter of seeking qualified impartial guidance in this perplexing issue of inflation. Every day the press carries conflicting comments on the problem. The other day Mr. Sales of Ford Motor Company was reported as condemning "panic propaganda from any quarter about so-called creeping inflation". On the same day the Defence Minister, Mr. Campney, was reported as saying "Canada is on the verge of inflation—the greatest danger that can hit a country".

If these were merely individual viewpoints, they might be no more than interesting. But we suspect that both these views have already been endorsed by large sections of the community.

Many people have come around to the view that they prefer inflation. This does not mean that they think inflation is a good thing. But they regard 'creeping inflation'—prices rises of the two per cent a year variety—as inevitable. Far better, they say, to pay this price for prosperity, than to try to keep prices steady, with disastrous consequences.

The trouble is, however, that nobody has devised a formula for holding inflation to the creeping stage forever. As the fact permeates the community that money is no longer a stable unit of calculation, people find themselves in an Alice in Wonderland environment: they have to earn more to maintain the same standard of living. Life becomes a scramble. To keep ahead of inflation, things have to be done today which in normal times would be better put off till tomorrow. People buy goods and put up buildings because they find they will be more expensive if they wait. The result of this scramble to keep ahead is an unbearable strain on the resources of today. This sort of inflation may start at a crawl, but it eventually explodes into a run-away riot.

If we are going to have a rational world in which people can plan soundly on the basis of actual need, we'll have to ensure that even creeping inflation is pegged. To this end the Bank of Canada has been following a tight-money policy and unofficial credit restrictions. The rate of increase in the money supply has been shoved down from its earlier excessive rate, and the rate of interest has been allowed to rise.

The rate of interest has carried the brunt of this policy of fighting inflation. Its role is quite in accordance with traditional theory! higher interest rates encourage saving and discourage new investment, thereby closing the gap between the supply of and demand for investible funds.

Since this theory achieved widespread acceptance fifty years ago, however, the environment in which the interest rate is to operate has been vastly altered. In those days there was no income tax, nor was there collective bargaining between gargantuan business firms and monolithic trade unions. Today with a corporation tax rate of 47%, the effective rate paid by a firm which borrows at 8% is the same as if before World War I, a firm had borrowed at 4%. Paradoxical as it may sound, lowering the tax rate raises the effective rate of interest.

Again, today we have the spectacle of collective bargaining between giants. Dr. John Galbraith, a Canadian-born Harvard economist, has studied some of the consequences of this magnitude. In his opinion, there will only be genuine resistance to the demands of the Union in periods of stability, in periods when the firms may have difficulty in passing on their increased costs to the consumer. In periods of excess demand there is no such difficulty, of course. Therefore firms quickly accede to the demands of the union and pass the increased costs plus a margin on to the customer. Wage inflation is what this is called, and the rate of interest has little effect upon it.

How, then, is the government to curb this inflation? It could dry up the excess demand by fiscal policy, by higher taxes for instance. But that lowers the effective cost of borrowing, and anyway this is an election year. Or it could resort to price controls. But even the die-hard left-wingers concede that the public wouldn't tolerate them.

One trade union in the U.S., the U.A.W., has proposed that corporations in the position to administer prices—firms accounting for over 20% of the market—be held publicly accountable for any price increases. "Such a corporation would give notice to raise prices to a governmental agency created for this purpose. The agency thereupon would conduct public hearings at which the corporation would be required to present detailed justification, based upon its records, of the need for the proposed price increase. The corporation involved would then be entirely free to raise the price if it so chose . . ."

The trouble, then, is not simply the control of creeping inflation, but also the discouragement of wage inflation. We are sure the officers and employees of the Central bank are diligently applying themselves to these problems in the best tradition of a silent institution—of an institution regarded as having big ears and a tight lip. But we are beginning to wonder, does this tradition fit today's needs? Is there not a need for more unbiased and clear talk on matters of monetary policy—more public information? The Federal Reserve System in the U.S., with its wealth of publications on monetary problems, has set a precedent in this matter that is worthy of imitation.

The people of this country have faith in the wisdom and impartiality of the Bank of Canada. It is very important that this faith not be worn thin. This is why someone should raise the blinds in Ottawa and open the windows so the bank's thinking can circulate.

C. & M. Round-Up . . .

By N. R. Barfoot

LOOKING AHEAD

$10 million will be buried in the ground this year by Canadian cities. Overhead wiring is going underground fast and it is about time according to town planners and utility companies. It has a practical as well as beautifying aspect.

—o—o—

$2 million will be lost this year through forged cheques. Watch for cheques already endorsed, and amounts larger than the purchase.

—o—o—

Unions are breaking tradition and hiring more university-trained administrators. Canadian Unions in the past have favoured up-the-ranks executives.

—o—o—

110,000 housing starts are hoped for 1957 due to higher N.H.A. lending rate; this is of course based on the theory of more mortgage money available because of the higher lending rate.

—o—o—

Courting more costly. The price of diamonds, both gem and industrial, will be raised 5.7 and 8.5% respectively. The central diamond selling organization reports demand for both types is high.

—o—o—

Nothing but taxes in one form or another to look forward to this time of year, Federal Tax returns due April 30th at the latest. Provincial budgets are coming down one by one now. Ontario gas tax up 2 cents. The Federal budget due late this month. Thank goodness Spring and Summer vacations are on the way.

—o—o—

GENERALLY SPEAKING

5.2 Billion Spending by Ottawa in 1957

The main estimates show 4,827 million or 183.4 million above last year.

Old age pensions at 392 million make up the difference.

National Defence spending will drop 57.7 million mainly in buildings and equipment, although pay increases to the armed forces were up 73 million.

Other major variations were 127.3 million extra for subsidies and provincial compensation. Ten million for Trans Canada Highway, 22 million for interest on public debt, 50 million deficit in the old age security fund.

—o—o—

THIS CHARITY BUSINESS

Raising funds for charity has become a big business. Most of it is done by volunteer organizations and is becoming highly organized with a permanent or semi-permanent paid administrative staff in each city of any size.

Here are a few interesting facts:

In 1938—14 Community Chest appeals raised 3.6 million. Last year

70 chests raised 17.8 million. In addition a number of United appeals brought in large sums. Toronto's United Campaign grossed 7.3 million.

Community Chest is a federated appeal by a group of local charities, United Appeal is applied when national agencies such as Red Cross, Salvation Army, etc. are joined to the local charities.

Payroll giving has been proven to be the most successful way and source of raising charity funds.

There are problems however to combined appeals. There is a mechanical and impersonal side and it deprives us of our sense of responsibility to our fellow man says one critic.

Another vexatious matter is the division of the collections among the agencies particularly when there may be up to 80 charities involved.

What is a Charity? is another.

Undoubtedly the funds raised are doing good work and do not materially affect the disposable income of contributing individuals.

QUEBEC

The Province of Quebec is participating in the Canadian boom in a big way. Some of the expansion news from "la belle province" makes fascinating reading.

Population is 4,635,000—30% greater than a decade ago.

Retail sales stood at 3.3 billion for '56 or a 205% increase over 1945—1,081 billion.

Mines and quarries produced 463 millions in 1956; a 380% increase in eleven years.

Construction value last year was 1.5 billion compared to 898 million in 1951.

Overall industrial production exceeded 8.6 billion last year compared to 3.4 billion at the close of the war.

55% of all Canadian textile production is located in Quebec and employs 45,000 workers.

Quebec accounts for about one-third of the value of chemical output for Canada—380 millions last year.

48% of Canada's drugs are produced in Quebec.

ON THE PERSONAL SIDE

1956 T.V. Sales sagged 21%—lower prices may result in 1957, plus a drive to promote the second set. Colour would undoubtedly stimulate the market but of course at the expense of black and white sets.

—o—o—

91 out of 129 people discharged because of laziness, very few are incompetent says a group of personnel officers, interviewed by the A.M.A.

—o—o—

An electric wrist watch is now on the market, no mainspring or winding stem is needed. It is powered by a year long battery the size of a coat button. It sells from $89 to $175.

—o—o—

$750 a head is the recruiting cost of a large U.S. firm in its efforts to find engineers.

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Books in Review . . .

SALES TAX — CANADA

450 pages. Hard cover. Published by the Canadian Manufacturers' Association, 67 Yonge Street, Toronto 1, Ont. $10.00 per copy.

A new manual dealing with Sales Tax and other Excise Taxes imposed under The Excise Tax Act and amendments has been published by The Canadian Manufacturers' Association. This manual supersedes the 1950 edition and is the 9th edition issued.

Part I deals with sales tax on domestic goods considered from the standpoint of the manufacturer who is accounting for tax on the actual selling price of his products. It also relates to imports, licensed wholesalers, and to a wide range of matters pertaining to the administration of the Excise Tax Act.

Part II deals with the application of the tax to domestic goods in cases where the manufacturer is operating what is usually referred to as an "unlicensed wholesale branch", and is accounting for sales tax on his products either on values determined by the Minister, or on wholesale prices established by sales to bona fide independent wholesalers.

Part III deals with excise manufacturing taxes imposed un' Parts IV and V of the Act and the periodical tax imposed under Par. II of the Act.

Manufacturers, accountants, lawyers, and others who have to know the answers to all questions relating to this integral part of Canada's tax structure will find this authoritative and up-to-date manual extremely useful and time-saving.

In the compilation of this edition, R. N. McCormick, Editor, has received the co-operation of Federal Government tax officials. Ever since the tax was instituted in 1920, Mr. McCormick has made a special study of sales tax legislation and is recognized as an authority on the subject.

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THE SOCIETY OF INDUSTRIAL AND COST ACCOUNTANTS OF CANADA

31 Walnut St. South **Hamilton, Ontario**

*Productivity** . . .

How to be Realistic in Its Measurement and Its Improvement

By Allen W. Rucker,
President,
The Eddy-Rucker-Nickels Company,
Cambridge, Mass.

North Americans think of productivity in terms of labour saved, while to Europeans productivity is synonymous with conservation of materials. By integrating the two viewpoints and adopting Production Value as the realistic measurement of productivity, the author shows how profit improvement can become an actuality.

PRODUCTIVITY is the other side of the coin usually known as "labour-saving", or the reduction of labour-time per unit of product output. You will know that these two terms, "'productivity" and "labour-saving" have essentially the same meaning, namely, an improvement in output relative to the input of labour.

In both of our two countries, industrial accountants, engineers and management generally have long laid heavy emphasis upon "labour-saving". Indeed the emphasis has been so heavy and so long continued that one could easily believe that "labour-saving" is the inner bastion of the competitive enterprise system and simultaneously a cornerstone of the North America Act and the Constitution of the United States.

Material-Saving Stressed in Europe

Our lasting faith in productivity per man-hour of labour is not so fully shared, however, by our European contemporaries. In most free countries abroad, the heaviest emphasis is on material-saving, rather than labour-saving. The reason, of course, is that in western Europe a high proportion of industrial raw materials must be imported; necessarily imported material costs must be reduced to every degree possible to protect a nation's balance of payments position, and likewise to maintain as wide a "spread" as possible between material costs and final product prices realized by domestic industries.[1] Hence, the heavier emphasis abroad is on material-saving with the lesser emphasis on "labour-saving". With us Americans and Canadians, the emphasis is just reversed.

In pointing up this distinction, you will know that I am not suggesting that European industry neglects "labour-saving" any more than I am suggesting that we here neglect material-saving. I am merely noting the difference in the direction of the emphasis between them and us.

---

*A talk before the Society of Industrial and Cost Accountants of Ontario, Hamilton, Ont., February 21, 1957.

(1) Rucker, Allen W., "PROGRESS IN PRODUCTIVITY and PAY" (1952), STEIGENDE PRODUKTIVITAET, STEIGENDER LOHN (1954).

Two Viewpoints of Productivity

This difference in emphasis leads to a difference in managerial attitude toward productivity as well as toward the quality and durability of the product. For instance, it is a commonplace that British and German durable goods of all kinds are made to last forever, whereas, on this side of the Atlantic we not only expect but invite change, improvement and technological obsolescence. To us, raw materials are abundant and comparatively cheap. They must conserve raw material but we have a lesser compulsion to do that. We must conserve labour in fabricating and converting raw material and they feel a lesser compulsion to do that because to them labour is comparatively abundant. We first want a high "product yield" per unit of labour input and they seek first a higher "product yield" per unit of material input. Thus, we have two viewpoints of productivity on the two sides of the Atlantic.

An Integrated Outlook

It will occur to you, as it has to me, that if the two viewpoints were fully integrated much more progress could be made on both sides of the Atlantic.

To do so, would profoundly change the scope and greatly expand the future opportunities for industrial cost accountants. To do so, would lift this profession in a few years from a mid-management staff status to the high level of practical industrial economists with a major influence in top policy making. I know men who have already risen to just such an eminence with a marked advancement in prestige, personal earnings and pride of achievement. The way is wide open for many others to do the same and even more. Let me, therefore, try to help map the road ahead and pinpoint the goals to which it leads.

Nearby Hamilton is Buffalo. In this city is a metal working firm that has accomplished the following since mid-1950:[2]

(a) Improved material utilization 5%;

(b) Cut rejects 47%;

(c) Boosted technological productivity for the entire working force, direct and indirect labour combined, by 17%;

(d) Improved the firm's earning capacity 56%—and increased the pay of employees over twice as fast as the general manufacturing average.

This is one firm, among others I can cite which has integrated the American emphasis on productivity and the European emphasis on material-saving by means of a realistic measure of productivity combined with an engineered plant-wide incentive as a spur to improvement.

(2) Pohlman, John H., "A Plantwide Incentive Plan on Top of An Individual Incentive", FACTORY, January 1955.

Achieving Integration of Emphasis

Let's see how this integration was achieved and what the realistic measure of productivity is. That look will give us a view of the new opportunity at hand for industrial cost accounting.

This chart (Exhibit I)[3] will bring out the different focuses of European and American emphasis and likewise show how they may be integrated. For instance,

At Line 2 appears the cost of Raw Materials consumed for the indicated value of output. At Line 3 appears the amount of "spread" between Selling Value and Raw Material costs. Obviously, the "spread" can be increased by a reduction in Raw Material consumption, both for the entire nation and for a single firm. For nations which import materials, every reduction made and every improvement in utilization achieved are alike a gain to the nation as well as to the individual firm. Any nation such as England and Germany, which is heavily dependent on imported raw materials (with or without dependence on finished goods exports) will focus on "material-saving" in the aggregate as well as per-unit of progress. The gains thus made either serve to improve their competitive prices in world markets, (Line 1) or help to widen the "spread" (Line 3) between Sales Value of Output and Raw Material Costs. Hence, the emphasis in Europe on "material-saving".

In Canada and the United States, where most natural resources are abundant and readily available domestically, but where labour is relatively much scarcer, we put the major emphasis at Line 4, on "labour-saving".

Of course we don't strive for "labour-saving" in order to hoard or sequester labour, i.e., in order to create unemployment. Quite the contrary; what we really seek to do is not to "save" labour in the hoarding or added unemployment sense but instead to generate more product and production value per man-hour of labour. For example:

Suppose in looking at this chart, Line 3, we could turn out the Production Value indicated therein, say 1,000 man-hours of labour. We would like, and should definitely seek, to enlarge our Production Value, not merely in order to turn out the same value with fewer man-hours, but to enlarge it at a higher rate than we enlarge the input of man-hours. Which is best, to cut the labour-hours for the same production value or to expand production value for the same labour hours? Cost accountants can easily pinpoint the answer from this chart, for:

If we simply reduce the labour costs say 10%, and this assumes that we can do so, we have gained a little less than 4c in a dollar of Production Value; we have increased management's share, Lines 2 and 4, about 6.7%. On the other hand, if we can add ten percent to total Production Value we can not only pay labour 10% more but we can also boost the remaining Production Value going to management by

(3) Rucker, Allen W., "PROGRESS IN PRODUCTIVITY AND PAY", Ibid.

10%. In other words, to turn out more Production Value with no more labour, and by giving labour an incentive to help us to do so, will be better by one-half again what we could gain by sheer "labour-saving". These figures are illustrative; the gain would vary with the nature of the industry. I know instances in which it is worth up to five

EXHIBIT I

HOW BUSINESS LIVES

All Manufacturing Combined
for Census Years 1914 to 1947 inclusive

	Billion $	Percent
I. RECEIVED FROM CUSTOMERS	$ 785,918	237.607%
II. Deduct: Paid to others for raw materials, supplies, power and like items	455,155	137.607
III. Production VALUE created within the business by the teamwork of Men, Management and Machinery	$ 330,763	100.000%
IV. PRODUCTION VALUE entirely disbursed for:		
A. Factory Hourly-Rated Labour Costs	$ 130,303	39.395%
B. Management Costs:		
1. Other Operating Expenses—all salary compensation, depreciation, real estate taxes, insurance, laboratory, sales, travel, advertising, and all expense other than hourly wages 2. Ownership Obligations— a) Interest on borrowed money b) Federal & state income taxes c) Dividends to stockholders d) Business savings for a "rainy day", and future expansion	200,460	60.605
V. PRODUCTION VALUE used	$ 330,763	100.000%

Source: "PROGRESS IN PRODUCTIVITY AND PAY, All U.S. Manufacturing Combined", The Eddy-Rucker-Nickels Company, Cambridge, Mass., 1952.

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Cambridge, Mass.

times as much to the company to enlarge production value per man-hour of labour as it would be to reduce labour hours with no gain in total Production Value. And this after, please note, paying labour an incentive of 1% for each 1% gain in Production Value.

Realistic Measures of Productivity

This approach is one which may be termed improved "labour utilization" rather than "labour saving". The better we manage to utilize labour, the greater the Production Value per man-hour. And so also, the better we utilize raw materials, the less of them we waste or damage or destroy, the greater the Production Value. That is easily seen by reference to Exhibit I, and noting how a reduction in "cost of materials" at Line 2 also enlarges Production Value.

If we thus measure "productivity" as an increase in Production Value per unit of input of both labour and materials, we have a realistic measure of accomplishment. We thus learn what "productivity" is worth, yesterday, today and tomorrow. We know its worth to a penny and we know it in a language every one can grasp—the figure language of dollars-and-cents. For example:

You can compare total Production Value with total plant hours of operation, and find the "yield" of the "productivity" per plant-hour. You can compare Production Value with net assets or net fixed assets, and find "productivity" per dollar of capital invested.[4] You can compare total Production Value with total Fixed Costs and learn that the ratio between the two will be a remarkably quick and accurate forecast of pre-tax profits of the business. You can compare Production Value to sales in dollars or in product units—and thus discover how your Sales Department varies in "productivity". You may even compare total Production Value with total material costs and find the "yield" or "productivity" per dollar of material cost. You also can take a month's Production Value and compare it to a month's factory payroll, thus getting a measure of Production Value per man-hour and per dollar of wage cost.

The Rucker Share of Production Plan

Let's take this last point and explore its range of possibilities that you can later help your firm to exploit. Suppose, for instance, that management said to your employees:

"See here, fellows: with a little better utilization of our raw materials, with less waste, spoilage, rejects and "do-overs", and with less idle time of men and machines, we would turn out five, ten or perhaps even twenty percent more Production Value in a month and a year. Right now we are getting $2.54 in Production Value per $1.00 of regular wages paid you. If you help us to boost that $2.54 by five,

(4) "What Becomes of Labour Savings From New Capital Investment?" COMMERCIAL AND FINANCIAL CHRONICLE, December 20, 1956.

ten, twenty or any percentage, we'll add that same percentage to your regular pay".

This is a simple, clear-cut proposition that anybody can understand —more Production Value means more Pay. Moreover, it works. Here, for example, is a firm making electrical equipment. Last year, this proposition to employees helped them to raise total plant Production Value by 20.68%. Employees were paid the same percent as an increase over their regular pay; the company gained after paying the incentive an average of $413 per man.

Take another example: In a plant making packaging machinery, the gain was 16.59% for the entire labour force as a team. As a result the employee whose base rate was $2.00 had his regular pay boosted 33c an hour; the company made $1,110 per employee after paying the incentive. Here's still another illustration, an English firm. In 1956, this incentive plan stepped up Production Value per unit of labour cost by 21.9%. The employees found that much more in their pay-packets and the company gained a total of £673,000.

If time permitted, I could cite a long list of just such cases taken from our files of American, Canadian, English and German firms using this plant-wide incentive and basing its results on the improvement in Production Value. This Plan is, of course, known everywhere as the Rucker Share of Production Plan.[6]

The Rucker Plan Means More Money

What does it do that has not been done before? Perhaps the best as well as quickest answer is this: The Plan solves a mystery, the most persistent and distracting mystery in the whole realm of industrial relations. It solves the mystery of how a man's regular hourly pay is related to what the Company gets for the product that he helps to make. It is not enough for employees to know the relation between hours of work and pieces, or pairs or tons of product produced. Somewhere along the line these physical measures of production have to be translated into money values received by the firm. To the worker in the plant, the mystery of this translation of physical units into money is as little understood as the mystery of sex is to an adolescent boy — and equally as subject to endless curiosity, misinformation, misjudgment and misguided action.

This mystery is solved forever when plant output is expressed in terms of the money amount of Production Value—and every man has the assurance that a 1% or a 25% increase in Production Value per unit of labour input means a 1% or a 25% increase in his pay cheque.

In brief, Production Value is a measurement that every one can understand and its relation to pay is just as clearly understandable.

(5) THE RUCKER PLAN, A New Approach to Higher Productivity and Improved Labour Co-operation: available on request from The Eddy-Rucker-Nickels Company, Harvard Square, Cambridge 38, Mass.

Production Value As a Measure of Productivity

But as we have already seen, Production Value is also a realistic measure of "productivity". It follows, of course, that when people understand "Production Value" they also can easily understand what we mean when we say "productivity". There is no longer any mystery about the latter and need not be.

And when we pay a share of "productivity" improvement to our employees as a reward for helping management to make better utilization of materials, man-hours and machinery, everyone easily sees exactly what is taking place in dollars and cents on a plant-wide basis. The "great mystery" is no longer a mystery but a logical procedure. It "makes sense" and what makes sense to everyone becomes a basis for cooperation and teamwork between everyone.

This is why, I think, that we are repeatedly obtaining a higher level of performance with a plant-wide plan than we can obtain with any other form of employee incentive.

What Productivity Measurement Means to Management

But the use of this practical and realistic measure of "productivity" ranges over the entire field of management. A few years ago I prepared an article on the relation of Production Value to a company's "break-even" and to the control of its variable operating costs other than labour costs. It appeared in the Harvard Business Review. Lately I have been told the requests for reprints far exceeded the average of such requests.[6]

A year or so ago, after one of our Economic Engineering Audits of one firm, I pointed out to the management a strange and awesome condition. Some 37% of the plant's productive capacity was being used to generate only 9% of its Production Value! In other words, a comparison by product lines of Production Value created with physical facilities used disclosed something no one had realized before. And in that same firm we also found that over 40% of Production Value were being created by use on only 18% of plant facilities. Those discoveries led to a shake-up of both marketing and sales emphasis as well as of the plant expansion programme.

In another instance, we measured the increase, 1950 to 1955, in Production Value and compared it to the increase in the same years of both capital investment and added costs of depreciation. The comparison made it clear enough that the capital investment had become progressively less productive—the firm was expanding in the wrong direction.

"Productivity" means more to modern management than so much output per dollar of labour. By using Production Value we may

(6) Rucker, Allen W., "Clocks for Management", HARVARD BUSINESS REVIEW, September - October, 1955.

measure realistically the "productivity" of capital, of the sales force, of the advertising, and of the plant facilities. We can measure the real worth of a product-line and even measure the ability of top management to control income as well as to cut expense. We can make these and many other measures simply because both input and output factors can be expressed in the common and meaningful language of money—Production Value.

Production Value — a Realistic Measure of Productivity

Over and above all of these, we have in Production Value a measure that above all measures is instantly sensitive to the inflationary forces at large in both our countries, and throughout the world. Future capital expansion, for example, must take inflation into account in forecasting the amount of investment required; how better to determine the return than also to forecast the added production required than in terms of Production Value? The same also goes for prices, and the cost of materials, and especially for wages. Inflationary forces everywhere express themselves in the rise in money values of goods and services, in the money cost of materials and of labour as well as of all other forms of operating expense, along with capital investment. To cope with those forces, to judge them and to manage them requires that our measures of "productivity" should include the only true and realistic money measure of "productivity", namely, Production Value.[7]

Continue to keep, of course, all the physical-unit figures and cost-per-this-or-that operation that you have. But if you want to bring all figures into focus, if you want to seize the opportunity of becoming of immeasurable value to your firm, turn to Production Value as the realistic measure of "productivity".

And set about finding ways and means to improve Production Value per man-hour of labour, per dollar's worth of material, per thousand dollars of capital investment. The possibilities are more than attractive, they are even spectacular, in terms of a firm's progress as well as in terms of advancement for the men who can show the way to accomplishment in these terms.

(7) "PRODUCTIVITY — Its Meaning, Its Measurement and Its Industrial Future", THE CONTROLLER, Controllers Institute of America, August 1955.

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Decentralized Profit Planning and Control . . .

By W. E. GORDON,
Assistant Divisional Controller,
Windsor Manufacturing Division
Ford Motor Company of Canada, Limited

In today's competitive manufacturing picture, effective planning and control for maximum profits is essential to the life of the enterprise. The following article describes such a system applied to the decentarlized organization of a large automotive manufacturer.

THE planning and control concept is one of the most vital phases of top management responsibility and it is in this area that modern accounting practice can make its most valuable contributions. The purpose of this presentation is to outline the financial planning and control function as it pertains to the Windsor Manufacturing Division of the Ford Motor Company of Canada, Limited. However, it would be helpful first to consider briefly the organization of the company's extensive manufacturing operations as a background to the ensuing review of the distinctive features of our integrated budgetary control system.

Organization of Manufacturing Operations

Since the post-war growth of Ford of Canada had outmoded the functional type of organization then in existence, the company has moved progressively toward a decentralized form of organization to achieve a more efficient and hence more economical organization structure. Our tremendous post-war growth indicated the need for greater flexibility in the administration of the company. This was particularly felt by the chief officers of the company who needed to have the burden of day-to-day operating decisions taken off their shoulders and, as a result, have more time to devote to forward planning for the company as a whole. As never before, forward planning is a vital key to keeping the corporate ship on a stable keel and pointed in the right direction. Under the former type of organization such major divisions of the company as Sales, Finance, Manufacturing, Purchasing, etc. had been established on a functional basis centrally administered. On the other hand, decentralization recognizes increased management participation in the formulation of policies and decision making and more effective control. Accordingly, Windsor Manufacturing Division has been established recently as a Profit Centre.

In order to ensure effective divisional administration and control, this Division has been organized on a modified line-staff basis and is comprised of five operating plants and seven divisional offices. Each Plant Manager and Office Head is responsible to the Divisional General Manager for planning and directing the activities of his plant or office

*An address delivered at the meeting of the Windsor Chapter, S.I.C.A. of Ontario on January 17, 1957.

in accordance with approved policies and procedures. The five plants are: the Machine Shop and Stamping Plant, the Power and Utilities Plant, the Foundry and Heat Treat Plant, the Tool and Die Plant, and the Engine Plant, and the seven functional offices are: Divisional Controller, Industrial Relations, Manufacturing Engineering, Plant Engineering, Production Control, Purchasing and Quality Control. Each of these staff offices is, in fact, a major unit with certain specific functional responsibilities designed to assist the operating executives to manage their plants profitably.

Extent of Plant Operations

As an indication of the magnitude of the Windsor operation and to assist you to visualize the corresponding complexities of our system of financial controls, I should like to review briefly the scope of our plant operations.

The Machine Shop and Stamping Plant (711,000 square feet) houses 43 departments, contains over 3,500 machines and produces about 4,500 machined parts and stampings including such major assemblies as transmissions, axles and front suspensions. The Foundry and Heat Treat Plant (225,000 square feet) houses 25 departments and contains the largest electrical furnace installation in Canada (16 electric furnaces and 2 cupolas) and can produce a total of 30 tons of cast steel and cast iron per hour. The Engine Plant (571,000 square feet) is the most modern in Canada. It houses 28 departments, contains over 500 production machines many of which are highly automated and manufactures and assembles parts for five basic types of engines with approximately 65 variations to suit customer options. The Power and Utilities Plant (114,000 square feet) has a capacity of 50,000 kilowatts and generates 800,000 pounds of steam per hour while consuming 450 tons of coal daily. The Tool and Die Plant (73,000 square feet) is one of the most modern in Canada in which more than 600 skilled craftsmen make precision tools on 340 specialized machines.

These facilities represent an original investment of more than one hundred million dollars—an amount exceeded only by a few companies in Canada today. It is not always fully appreciated that despite decentralizing some phases of our operations, roughly two-thirds of all our company's wages and salaries go to its Windsor employees.

It is apparent from the foregoing outline that this Division of the Company has its own facilities and organization and can operate in principle as a separate business. The General Manager of the Division is responsible to the President and Executive Vice-President for planning and directing the activities of this separate Division *on a profit basis*, within the general framework of broad company policies for the manufacture, pricing and sale of its products. In other words, the Division, as a Profit Centre, negotiates business transactions with

other Divisional Profit Centres and outside customers on a competitive basis. It is significant to note that the method of financial control to be outlined has been instrumental in making possible this decentralization of responsibility on a very thorough and effective basis.

Planning and Control

Although the two elements, planning and control, cannot be considered as separable parts of the financial management process, the following broad distinction will be made in order to simplify the discussion. Planning will be interpreted with reference to our Annual Operating Budget which provides a comprehensive financial interpretation of management plans of action. Control is required if we are to attain the profit objective and will be interpreted in terms of standard budgets and the comparison of actual results with targets to determine where corrective action must be taken or where changes in policy must be made.

The fundamental feature of our financial control system is our Annual Operating Budget. The purpose of this financial control tool is to establish a realistic profit objective and to provide management with a guide to assist in evaluating how to achieve the planned profits. The entire preparation of this Annual Operating Budget is based upon the coordination of management policy and expectations so that it will represent a realistic and attainable profit plan. This is essential if it is to be used during the year as a reliable basis for making and carrying out management decisions.

Revenue and Cost Measurement

Since the specific delegation of profit responsibility is an inherent element of the profit centre concept, it is necessary to measure both the revenue and cost aspects of profit performance. The significant requirement for Profit Centre operation introduced at this point is the determination of competitive sales revenue. This difficult task is accomplished by the negotiation of "Intra Company Transfer Prices" for all components manufactured and sold to other Divisions. These negotiations are the responsibility of the Divisions concerned and unresolved disputes are referred to Central Staff, but such appeal action occurs only in exceptional cases.

The determination of competitive selling prices is relatively simple for the many parts that are also manufactured outside the company since the transfer price cannot exceed the competitive price. However, for those parts and assemblies, such as Ford Engines, that are produced only within the Company, no competitive prices are available. In such cases the equivalent competitive price is approximated by calculating the cost that would be incurred by an efficient producer using modern facilities and equipment and adding on the profit margin justified for the type of product concerned. In both of the above instances the

transfer prices would not exceed the equivalent competitive levels and, therefore, provide the necessary incentive for Divisional Managment to study the competitiveness of every product in order to reveal potential areas for improved profitability and successfully meet the continual pressures from the buying divisions who are constantly searching for lower prices by means of aggressive purchase analysis.

The Production Schedule

Since this Annual Operating Budget is a short term operating budget, the most logical starting point is the Company's Official Production Schedule for the forthcoming year. This ensures that all phases of management planning are directed consistently toward a unified plan of action reflected in an integrated profit planning and control device. Our Production Control function translates this Vehicle Sales plan into a production plan for the manufacture of component parts and assemblies. Since this master production plan takes into consideration both runahead floats and bottleneck operations, it provides a reliable basis for estimating sales revenue and operating and administrative costs in order to produce a coordinated profit pattern for the year.

Divisional Sales Budget

The scope of this Annual Operating Budget is broad enough to include all the elements of a conventional profit and loss statement and balance sheet with supporting schedules and analyses. To begin with, the production schedule and transfer prices are used to prepare a detailed Divisional Sales Budget classified by customer divisions and major product lines. This is an exceedingly important schedule since it focuses management attention on the adequacy of the revenue factor and the contribution that revenue improvement can make to greater profits and emphasizes the dynamic nature of profit centre management which includes a responsibility for increased sales similar to that existing in a separate company. By stressing the opportunities for obtaining more of the Buying Divisions' purchases by beating outside vendor competition and the possibilities of developing greater outside sales by increased and more varied market penetration, we are realizing an important advantage of profit centre control quite apart from the more familiar cost reduction aspects of budgetary control with which we shall deal later. This is of particular importance when unused capacity exists, in view of the heavy preponderance of fixed costs.

Setting the Costs

The next step in formulating the Annual Operating Budget is the compilation of all elements of anticipated cost of the production and sales just described. By making use of the Company's standard costing and flexible budget techniques, the standard cost of each product is

developed by direct material and direct labour and fixed and variable elements of manufacturing expense. After having established product standard cost absorption we are faced with the problem of forecasting economic conditions and other pertinent factors. These include expected material and labour cost increases, exchange fluctuations, emergency purchases, inventory obsolescence reserves, operating irregularities, etc. To these must be added a realistic recognition of the impact of new facility and new model launching costs which assume significant proportions in the automotive industry. We are now able to complete the Cost of Goods Sold Budget and the Gross Profit Budget which provides a means of measuring performance for material, labour and overhead and appraising the profitability of every product. The final summary profit and loss projection reveals the expected net profit before taxes for the Division.

The Balance Sheet Forecast

We then translate this profit data into a projected Balance Sheet. The tasks of estimating cash, receivables and payables are relatively simple with the main problems being encountered in determining inventory requirements and changes in fixed assets. In order to forecast desirable inventory levels a formula has been developed relating standard direct labour hours to production material. Application of this ratio to forward production schedules reveals the amount of production material that should be on hand at any time to accommodate subsequent production requirements. This basic figure is then adjusted for anticipated runahead, scarcity of supply, favourable buys, etc.

The forecasting of fixed asset requirements is an important phase of our system of controls for capital expenditures. This short term capital budget is based upon a financial evaluation of proposals submitted, most of which originate from our engineering groups. The division General Manager has independent approval authority to a certain limit and participates with Central Office beyond this point in view of the long term effects of such commitments on capacity, efficiency, costs and cash flow. In order to integrate divisional facility expenditures with company-wide objectives, a coordinating committee reviews all major facility proposals. This approved forecast of capital appropriations is summarized for use in the balance sheet forecast which provides the final schedule for our Annual Operating Budget.

Presenting the Annual Operating Budget

We are now prepared to make our presentation of this Annual Operating Budget to Divisional Management and in order to ensure its effectiveness, we include summaries of all significant elements together with concise interpretive commentaries, trend analyses and a critical overall appraisal of the net profit estimate but exclude the

many details which would only obscure the real meaning of the financial projection under review of this senior level.

As a guide to the acceptability of the operating plan the return on average assets employed is calculated. The presumption here is, of course, that profit must be earned on all of the assets used and that certain objectives must be reached. As a result, "return on assets" becomes the basic measure of managerial efficiency. We consider this profit performance measurement most appropriate for profit centre control since it is based upon all the profit factors of revenue, costs and assets employed.

Establishing Divisional Targets

The General Manager of the Division now has pertinent facts impartially interpreted and, in line with his responsibilities for planning and control, can establish his divisional objective within the general framework of the profit plan for the Company. If the budgeted profit based upon the plans and expectations of operating supervision is inadequate, realistic targets must be established with the cooperation of each functional component of the Division. When mutually acceptable revisions are incorporated and the profit budget for the year is approved, it represents the implementation of the first stage of the long run profit improvement plan formulated with the complete participation of the members of management who will be responsible for subsequent performance to the plan. This master budget is based upon a fixed volume and a definite set of operating conditions and enables us to measure actual profits against planned profits each month and analyze variances from the pattern. We accomplish this by incorporating the approved budget estimates into our monthly financial statements which provide Divisional Management and Central Staff with a comprehensive and progressive financial interpretation of operating results throughout the year.

Further Breakdown of the Operating Budget

Before turning our attention from planning to control, we should pause to ensure that we appreciate fully the significance of the planning function since the concept of control is based upon the measurement of performance by means of a comparison of actual with the approved plan and this analytical appraisal can be no better than the budget itself. Since the financial plan indicates what we plan to happen, we are now concerned with how we are going to make it happen. In other words, the fixed profit and loss budget is used by senior Divisional Management for planning and setting targets, but operating management much closer to the complex operations must be provided with an interpretation of recent actual costs as a guide to immediate action. This applies particularly to direct labour and manufacturing expense which are for the most part under the direct control of operating

supervision. The resulting susceptibility to cost control justifies a breakdown of the Annual Operating Budget into the finer details of pure standards, individual departments and specific accounts.

The Standard Volume Concept

The foundation of our flexible budget system is standard volume which is a carefully prepared estimate of average annual sales over the next five year period. Such economic factors as forecasted gross national product and consumer income are translated into estimated automobile sales to which is applied our Company's market penetration objective. Use of the standard volume concept eliminates the distortion in unit costs caused by short-term fluctuations in volume and provides a sound basis for interpreting fixed and variable costs.

Although the direct labour budget is simple in theory, since this cost element is considered completely variable, its preparation becomes rather involved. A labour bill is prepared which converts the general concept of standard volume into a plan of operation for each production department by sourcing every part to a department or vendor. Current work standards are then applied to the standard volume quantities of each part to determine the number of standard direct labour hours and dollars that each department should incur in order to produce standard volume.

Manufacturing Expense Budget

The preparation of the manufacturing expense budget is more complicated since this requires an analysis of the effect of volume changes on every type of expense. For this purpose, we use the familiar fixed, variable, and semi-variable categories. Fixed expenses such as depreciation, taxes and insurance are not affected by changes in volume during the year. Variable expenses are exemplified by operating supplies and expendable tools which vary proportionately with volume. Semi-variable expenses such as indirect labour vary irregularly as volume increases or decreases. This classification of expense enables us to determine allowable expenses at any level of operations and also enables operating supervision to concentrate fully on those costs which they are able to control effectively.

By means of a careful analysis of past expenses and the incorporation of engineering standards wherever possible for such costs as indirect labour, expense tools, operating supplies, etc. a standard budget at standard volume is prepared for every department whose activities are related to changes in volume. Rather than develop budgets for graduated levels of volume, we prepare a basic budget at standard volume with every account classified as fixed (including the non variable portion of semi-variable) or variable (including the variable portion of semi-variable) so that a standard budget can be calculated very simply for any volume within the normal range of opera-

tions. However, in view of our extensive indirect labour requirements, specific budget authorizations are provided by means of detailed "step" charts which show job requirements at various levels of activity. For staff and administrative departments, appropriation budgets are developed based on anticipated work loads and approved management plans. Department heads, with the assistance of staff functions, are responsible for preparing these budgets which are then reviewed and approved by each successive level of management. Plant, Office and Divisional summaries are compiled and comprise one of the key sets of schedules in the Annual Operating Budget presented for divisional management approval.

In order to provide a detailed measure of expense control, these standard budget relationships are applied to the actual volume of production for the day, week or month concerned using standard labour hours as the unit of measurement or factor of variability. This budget allowance represents the amount of expense that should have been incurred for the volume actually achieved rather than for some previously scheduled volume. The purpose of this approach is to provide cost control information in the form required by operating supervision. Although this exclusion of the volume variance makes it easier for the foreman to control costs and plan operations, performance to this budget does not indicate achievement of the profit goal in the event of a volume decline. For example, full allowances would be provided at the lower volume for fixed costs even if such reduced volume resulted in an operating loss. However, the Annual Operating Budget remains fixed and the variance analysis reveals the effect of volume on the profit objective. This illustrates the principle of retaining the master budget and providing supplementary controls for specific purposes.

The Reporting System

Since the real purpose of our flexible budget is to measure the efficiency of actual performance, particular attention is paid to the speedy and accurate reporting of variances. To fulfill these requirements effectively we have developed an "Integrated Operating Performance Reporting System" which is based upon a careful interpretation of the type, scope and frequency of reports required by each level of management. In general, the most detailed and most frequently issued reports are those prepared for the action of department heads who concentrate on day to day control of operations. For more senior members of management, who are concerned with reviewing performance, the reports are more condensed covering longer periods of time and wider areas of responsibility.

The head of a staff or administrative department receives a monthly performance report by accounts and the variance analysis is accompanied by an evaluation of progress toward accomplishment of

the objectives on which the budget was based. The office head receives summaries by expense account groups and departments to enable him to appraise the departments under his jurisdiction. This reporting technique is more involved for plant departments. Daily reports are issued showing performance by part, operation, line or total depending upon the degree of refinement required for effective control. In many cases the reports also include off-standard hours analyzed by the following basic causes: manpower, machinery and equipment trouble, material, facilities, scheduling and model changeover. For manufacturing expense we provide the foreman with a report including only key items of cost which are subject to control on a daily and weekly basis. Subsidiary reports point out such important costs as maintenance by machines, spoilage by part numbers and idle time by major causes. Each plant manager receives daily and weekly summaries of the departmental reports to facilitate his appraisal of plant performance in terms of people reporting to him. He is also provided with a monthly plant summary of total manufacturing expense by account groups and departments since the weekly reports are designed for selected key expenses. The Division Head is supplied with weekly and monthly divisional summaries but receives no daily reports. In this reporting process we do not exempt the items of "so-called" non-controllable expense. Although we exclude fixed costs from weekly departmental reports, we include them in monthly plant and divisional summaries to recognize the fact that fixed costs represent a management commitment to a definite course of action. Such fixed costs are really controllable from a long-term point of view since they can be changed by senior management action over a period of time. One of the most important and difficult aspects of this reporting system is the variance analysis and commentary that provides an explanation of all significant variances and outlines planned corrective action. Budget analysts who are located in the plants provide an invaluable service to the foreman by analyzing costs and revealing potential sources of cost savings.

Reviewing Performance

We all realize that no amount of reporting and analysis will reduce costs unless the reports are used as the basis for planning and taking aggressive action to eliminate unfavourable variances. This brings me to the final phase of my discussion of control which deals with a series of cost meetings designed for each level of executive authority based upon the same philosophy that influenced the design of our integrated performance reporting system.

At the plant department level a weekly Cost Clinic is chaired by the department general foreman for the purpose of solving specific operating problems. Only those plant or divisional staff representatives that can contribute directly to the solutions required are invited to attend. Minutes are issued which provide the necessary follow up for

continuing problems. These clinics cover a very wide range of activities and, if properly conducted, can contribute substantially to improve budget performance. It should be stressed that these meetings are called for action and are not round table discussions or conferences. The Plant Manager conducts a monthly Cost Review for the purpose of advising his operating staff of total plant cost performance, directing special attention to problems of a plant-wide nature and coordinating the entire plant management team for the maximum attack on excess costs. A monthly meeting of senior divisional executives comprising the Operating Committee is held to review the division's performance to standards and profit objective. This meeting permits active discussions by Plant Managers and Office Heads under the direction of the General Manager to plan and evaluate alternative courses of action necessary for cost improvement and performance to the Annual Operating Budget.

Conclusion

This programme of financial planning and control to maximize profits is of paramount importance to us in view of the extremely keen competition, rapid technological advances and frequent design changes that characterize the automotive industry today. To fulfill the increasing responsibilities for financial assistance and advice to the management of such a complex manufacturing organization, the function of Divisional Controllership has combined the technical requirements of sound accounting with the managerial requirements of vigorous profit planning to ensure the most effective financial organization for dynamic profit control.

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Costing for Decision Making . . .

By LEONARD A. COHN,
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Sound managerial decisions require special costing techniques, the author of this article urges. Conventional costing techniques, designed primarily for inventory valuation and profit determination, are not always applicable in management decisions which do not rest with cost alone and thus applied may even prove misleading.

AN important problem in industry is that of properly evaluating alternative process methods, alternative capital expenditures, or alternative use of multi-purpose equipment for the manufacture of one of several products for which sales demand exists. The usual inventory valuation techniques may be useless and are often misleading when applied to these problems.

The emphasis placed on cost determination for inventory valuation and profit determination has tended to obscure the fact that conventional costing techniques often lead to either poor decisions or leave the manager without adequate information to make a sound decision. Clearly, we must have different costs for different purposes.

The Need for Better Costing Techniques

For many years, economists have used marginal cost concepts in the development of their theories. Today marginal costs (or differential, or incremental costs) are left largely to the estimating ability of managers. Little has been accomplished by the accounting profession to develop methods for costing, or segregating costs, on a marginal basis. As industry becomes even more complex, yet at the same time more flexible in its operating alternatives, the need for better costing for decision rather than for valuation take on greater significance.

The following case is an actual illustration of how the customary cost accounting techniques could yield unprofitable decisions. Not only will they give a misleading original cost picture for immediate decision, but will be of no value for future analysis and decision as various production facilities shift in capacity, as operating costs change in nature and amount, and as sales demand for the product rises and falls.

The cost figures presented are fictitious, being selected to illustrate the problem; the situation is real. It has been chosen to emphasize the need for knowing the amount and characteristics of costs as they occur throughout the production process.

The Situation

Product A has been manufactured by The Company for several years. It is one of a small number of raw materials of its type for one of the nation's fastest growing industries. Recently, some commercial

interest has developed in Product B, another potential raw material for the same industry. The Company's sales development was of the opinion that in a few years Product B would displace some of the demand for Product A, not to the extent that there would be a declining demand for Product A, but that it would cut into its growth rate. With this in mind, and with other producers of Product B starting to develop the product commercially, The Company thought it might be judicious to place their "foot in the door".

The manufacture of Product B (by the Company's process) involves the conversion of a by-product resulting from the manufacture of Product A. The physical flow of goods in process for Product A is shown in Figure 1. The raw materials enter in Step I, are processed further in Step II, and finished in Step III. Note that part of the material leaving Step II must be recycled back and re-supplied to Step II. The raw material for Product B is taken from this recycle stream. The amount of the recycle is a function of the Step II production and is inherent to the processing techniques. The withdrawal from the recycle stream of the raw material for Product B is optional. The effect upon Department A, which is of prime consideration, is that all the material pulled from the process in the Step II recycle reduces the amount available as in process feed for Step III. This may limit the production of Product A.

Determining the Return on Investment

When the production of a new product will affect an existing operation's profitability, there are several approaches which may be followed in determining the net return on the new capital. In the example, the production cost of the optional by-product may be determined at the expected level of operation; this cost increased by the return on investment of the producing department, so that it will show the same return on its investment under either operating circumstances, will be the transfer price to the proposed unit. Another method would be to transfer a portion of the capital investment in the existing plant to the estimated capital required for the proposed addition. This transfer would presumably be made on the basis of the ratio of by-product production to primary product production applied to the existing capital investment in the primary product process up to the point of the by-product take off.

Although either of these approaches may give the necessary basis for a profitable decision, both tend to cloud the net effect on the company's return on investment. Also, the effect of a different level of operation or of a different ratio of by-product to primary product production is not clear.

A better approach may be to determine the incremental profit resulting from the new operation. This incremental profit, less the loss of profit, if any, from existing facilities, applied to the added

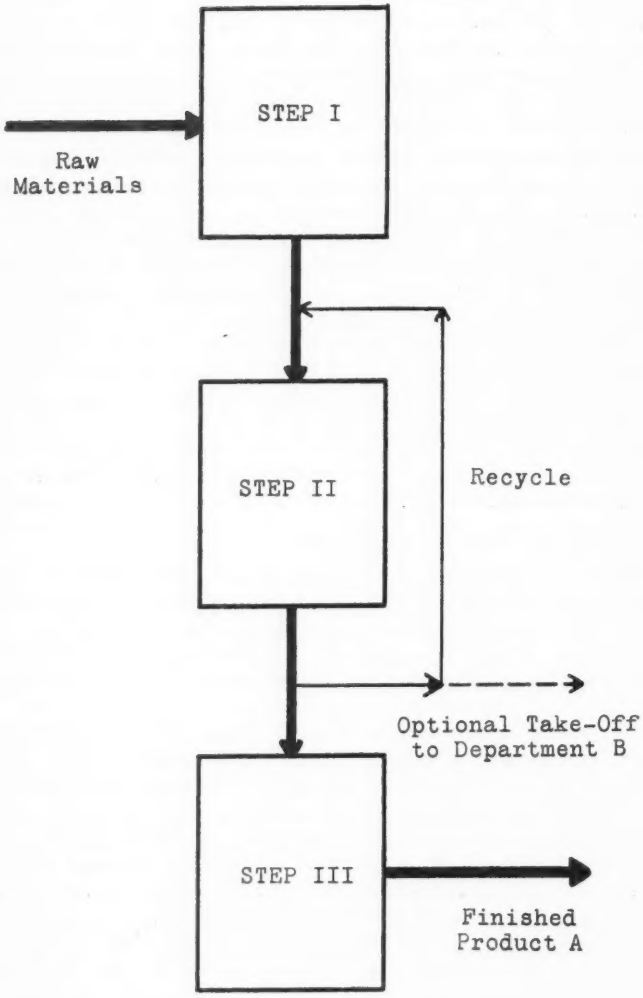

Figure 1. Process Flow Sheet, Department A

investment, as well as a breakdown of the application of the incremental costs by production steps should provide the cost data required for a sound decision.

The Cost Breakdown

Before the various costs are examined, one other point must be explored. In almost all multi-step manufacturing processes some point in the system is a production "bottleneck". That is, some operation in the process is going to have less capacity than any other particular phase of the operation. It is seldom that all steps are exactly in balance production-wise. Even with an exceptionally good design of the original plant, technological advances in processing will soon throw what may have started as a balanced production system out of equilibrium. The position of this "bottleneck" in the example alters the cost situation, hence the managerial decision.

The flow diagram shown in Figure 2 represents the cost flow. The white arrows indicate variable costs, the black arrows fixed costs. The heavy black base and diagonal line within each step represent the relative amounts of fixed and variable costs added in the step as the production level changes. At the normal operating level of Department A and expected level of Department B, the cost breakdown is as follows:

DEPARTMENT A

Product—A
Selling Price—70c per pound
Normal Production Level—10,000,000 pounds per year

Step	Unit Cost Per Pound Product A
I	30c
II	6c
III	10c

DEPARTMENT B

Product—B
Selling Price—70c per pound
Normal Production Level—1,000,000 pounds per year

Cost added to raw material per pound of Product B	10c
Raw material cost at standard	36c

The Use of Standard Costs

A standard cost system is utilized by The Company for inventory valuation and cost control. Decisions for new capital expenditures are based upon expected production levels (from sales estimates) and the inventory standard cost relating to that level of production. This yields an estimated net profit, hence an estimated return on investment.

The accounting department has established the policy of transferring all materials from one department to another at standard cost.

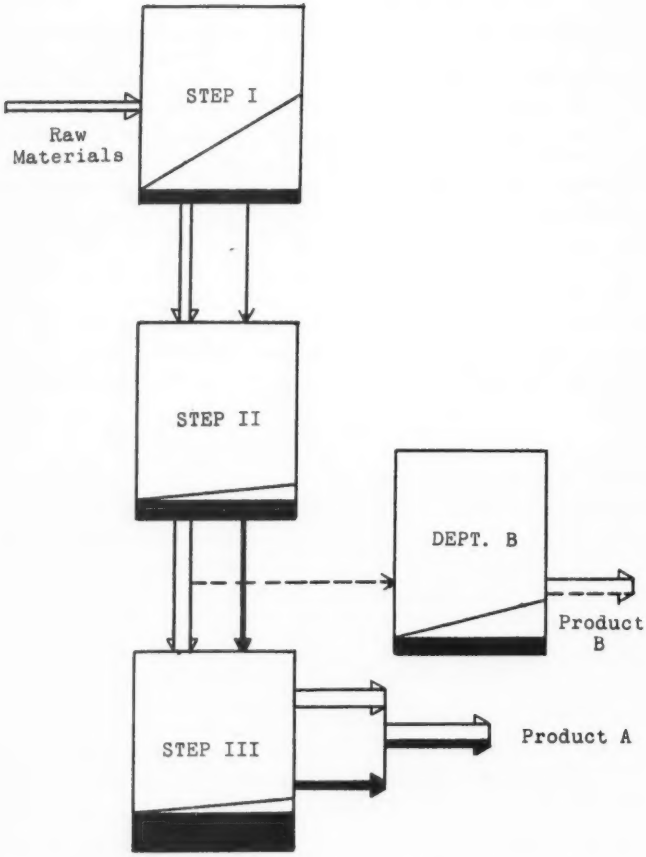

Figure 2. Cost Flow Sheet, Departments A and B

If this policy is followed in making the decision as to the profitability of entering into production of Product B, the following analysis would be made. For the sake of simplicity, the same pound for pound yield will be assumed for Product B on the material leaving Step II as for Step III on the material leaving Step II.

Existing Situation: Production of A

Sales:	10,000,000 lbs. @ 70c	$ 7,000,000
Less:	Manufacturing cost 10,000,000 lbs. @ 46c	4,600,000
Gross Profit		$ 2,400,000

Situation Under Consideration: Production of A and B

Sales:	10,000,000# A @ 70c	$ 7,000,000	
	1,000,000# B @ 70c	700,000	
			$ 7,700,000
Less:	Manufacturing Cost A 10,000,000# @ 46c	$ 4,600,000	
	Manufacturing Cost B 1,000,000# @ 46c	460,000	
			$ 5,060,000
Gross Profit			$ 2,640,000

Thus, from an analysis based on limited cost data, and assuming Steps I and II of Department A have the capacity to handle both Department B and Step III, it appears that $240,000 of additional gross profit is available for justifying additional capital investment in Department B.

The Projected Cost Analysis

With adequate cost data a much more refined, and realistic, analysis can be made. At the production levels expected for Departments A and B, the following incremental costs exist:

Department A

Step	Incremental Cost Per Pound A
I	28c
II	1c
III	2c

Department B

	Incremental Cost Per Pound B
Raw Materials (Step I & II)	29c
Cost added in Producing B	8c

Assuming, as before, that Steps I and II have sufficient capacity to meet the demand for Product A and B, the cost analysis would be as follows:

Manufacturing Cost A:		
11,000,000# through Step I and II	$ 3,890,000	
10,000,000# through Step III	1,000,000	
		$ 4,890,000
Less: 1,000,000# transferred to Department B		290,000
Cost of producing 10,000,000# A		$ 4,600,000
Manufacturing Cost B:		
1,000,000# raw material from A		$ 290,000
Added cost		100,000
Cost of producing 1,000,000# B		$ 390,000

This analysis shows $310,000 gross profit available to justify the needed capital addition. Note that Product A still carries all the fixed charges for Steps I and II. Whether this is proper costing or not is argumentative, but regardless if it is carried by A or proportional to B, there is no net effect on the entire charges.

Other Assumptions

However, what is the situation if Step I or Step II does not have the production capacity required to meet both the demand for Product A and Product B? The following example assumes production of A is sacrificed to meet the demand for B.

Manufacturing Cost A:		
10,000,000# through Steps I and II	$ 3,600,000	
9,000,000# through Step III	1,000,000	
		$ 4,600,000
Less: 1,000,000# transferred to Department B		360,000
Cost of producing 9,000,000# of A		$ 4,240,000
Manufacturing Cost B:		
1,000,000# raw material from A	$ 360,000	
Added cost	100,000	
Cost of producing 1,000,000# B	$ 460,000	

With only $7,000,000 revenue, the same as if all production went to Product A, the profit is $2,300,000 compared to $2,400,000 profit if only Product A was manufactured.

If the production of B is expanded under the last situation examined, that is at the expense of Product A production, the profit will continue to decline by the 6c per pound difference in the incremental costs of Step III and Department B. Under these circumstances, the $310,000 gross profit shown in the previous situation would have to justify not only the capital necessary for the manufacture of Product B but also the capital necessary to increase the capacity of Department A's Steps I and II by 1,000,000. This added capital in Department A would carry fixed charges which would reduce the profit as shown. A complete separate analysis would be required if this method of operation appeared feasible.

Utilization of Idle Equipment

Another situation which commonly arises is that of utilization of idle equipment. If the equipment necessary to operate Department B is idle, that is the costs are sunk, then the profit would increase by the amount of those charges. Assuming all the fixed costs to be depreciation charges, this would amount to $20,000 in this example. In some situations where the equipment is relatively standard and hence available for a number of operations, business managers maintain a policy of treating the capital sunk in idle equipment as new capital required for the purpose of justifying use of the equipment. What the economist would call the opportunity cost of the idle equipment may often eliminate consideration of a proposed expansion; the use of this particular philosophy is a matter of managerial policy.

Conclusion

The decision to manufacture Product B or any number of managerial decisions rests not with cost alone. However, all other advantages, many of which are intangible, are usually weighed against cost or profit. Sound decisions cannot be made from cost information which, though accurate, does not have direct application to the situation. To achieve a costing system designed to aid managerial decision will require money and imagination. What once was considered impractical due to its complexity may now be economically sound due to the advent of the electronic calculators and memory units. As management's problems grow in complexity and competition forces an ever increasing percentage of "right" decisions, the cost of obtaining applicable cost information may soon be outweighed by the profits available from its use.

FOR FURTHER READING

UP-TO-THE-MINUTE COSTS FOR MANAGEMENT PLANNING, by I. Wayne Keller, N.A.C.A. Bulletin, March 1951.

AIDS TO MANAGEMENT THROUGH COST ACCOUNTING AND BUDGETARY CONTROL, by C. W. M. Court, The Chartered Accountant, Australia, Jan. 1953.

THE RELATIONSHIP BETWEEN COSTING AND MANAGEMENT, by W. C. Scott, The Cost Accountant, July 1950.

Student Section . . .

EXAMINATIONS, 1956

FUNDAMENTALS OF COST ACCOUNTING

QUESTION III (20 marks)

The records of the Hollingshead Manufacturing Company show the following:

Inventory, January 1:				
Materials	15,600 lbs.	at	$2.10	$32,760
Work-in-process	8,000 units	¾ of which are processed		31,120
Finished product	12,000 units	at	$4.50	54,000
January transactions:				
Materials purchased:				
1/5	8,000 lbs.		$2.18	$17,440
1/11	6,000 lbs.		2.24	13,440
1/18	3,000 lbs.		2.22	6,660
1/28	5,000 lbs.		2.26	11,300
Department payroll				18,260
Departmental overhead applied at rate of 150% of payroll				
Actual overhead				30,125

Production report for January:

Product finished.	26,000 units.
Work-in-process, Jan. 31.	3,000 ⅔ of which are processed
Materials inventory, Jan. 31.	15,600 lbs.

REQUIRED:

A cost of production statement.

(Inventory of materials is to be valued using the LIFO method. and work in process using the FIFO method.)

SOLUTION III. **Exhibit A**

HOLLINGSHEAD MANUFACTURING COMPANY
PRODUCTION COST STATEMENT
For the month ended January 31st, 1956.

Raw material:		
Raw material purchased during the month	$ 48,840.	
Add:		
Inventory, January 1st, 1956,—on last-in first-out basis of pricing	32,760.	
	$ 81,600.	
Deduct:		
Inventory, January 31st, 1956,—on last-in first-out basis of pricing. (Schedule 1)..	32,760.	$ 48,840.
Direct labour		18,260.
Manufacturing expense applied,—on the basis of 150% of direct labour		27,390.
		$ 94,490.

Add:	
Inventory of Work-in-process, January 1st, 1956, —on first-in first-out basis of pricing	31,120.
	$125,610.
Deduct:	
Inventory of Work-in-process, January 31st, 1956,—on first-in first-out basis of pricing. (Schedule 2)	8,590.
Production costs for the month	$117,020.

Comment:

Some accountants would include the amount of under- or over-applied manufacturing expense as the last entry in the Production Cost Statement.

Strictly speaking, these amounts relate directly to the cost of production, but they are more generally treated as additions to or deductions from the Cost of Sales.

Schedule 1

HOLLINGSHEAD MANUFACTURING COMPANY
INVENTORY OF RAW MATERIAL
January 31st, 1956.

(a) Raw material issued to production: (pounds):	
Raw material purchased during the month	22,000
Add:	
Inventory, January 1st, 1956	15,600
	37,600
Deduct:	
Inventory, January 31st, 1956	15,600
Raw material issued to production	22,000

(b) Raw material inventory, January 31st, 1956:

	Quantity	Unit Cost	Amount
Raw material purchased during the month	22,000	n/r *	$48,840.
Add:			
Inventory, January 1st, 1956	15,600	n/r *	$ 32,760
	37,600	n/r *	$81,600.
Deduct:			
Raw material issued to production from receipt of:			
Jan. 28th	5,000	$2.26	$11,300.
Jan. 18th	3,000	2.22	6,660.
Jan. 11th	6,000	2.24	13,440.
	14,000	n/r *	$31,400.
Jan. 5th	8,000**	$2.18	17,440.
	22,000	n/r *	$48,840.
Inventory, January 31st, 1956. (Exhibit A).	15,600	n/r *	$32,760.

* Not required for purposes of the problem.

** In this problem, it was apparently a coincidence that material purchases on January 5th were exactly equal to the balance of raw material required for production.

Schedule 2

HOLLINGSHEAD MANUFACTURING COMPANY
INVENTORY OF WORK-IN-PROCESS
January 31st, 1956.

(a) Unit production data:

	Physical units	Stage of completion	Equivalent complete units
Inventory, Jan. 31st, 1956	3,000	2/3	2,000
Add:			
Production during the month	26,000		26,000
	29,000		28,000
Deduct:			
Inventory, Jan. 1st, 1956	8,000	3/4	6,000
Process production	21,000		22,000

(b) **Work-in-process inventory, Jan. 31st, 1956:**

Unit Cost:		
Process additions. (Exhibit A)	$ 94,490.	
Equivalent complete units. (Above)	22,000.	
Unit cost		$ 4,295
Work-in-process inventory value:		
Equivalent complete units. (Above)	2,000.	
Unit cost. (Above)	$ 4,295.	
Work-in-process inventory, January 31st, 1956. (Exhibit A)		$ 8,590.

STUDENT SECTION

ADVANCED COST ACCOUNTING—PAPER I

Comments by George Moller, D. Jur., C.A., R.I.A.

QUESTION I (3 marks)

State in clear terms the essential **difference** between Estimated Cost and Standard Cost systems.

(Your explanation should not exceed half a page.)

SOLUTION I.

Standard costs are considered the true costs, whereas estimated costs are not presumed to be correct and are subject to adjustments and corrections.

Both costs are predetermined but standard costs are obtained from scientific analysis, research and motion and time studies whereas estimated costs are normally derived from historical costs or educated estimates.

Standard costs are used for control and efficiency is measured against standard through variances. Estimated costs are not suitable for the same purpose.

Standard costs are an essential part of budgetary control. Estimated costs are too inaccurate for this purpose.

COMMENT:

Most students knew the principles of both standard cost and estimated cost but found the biggest difficulty in expressing themselves and indicating the **essential difference.**

QUESTION II (7 marks)

Name three principal objectives of budgeting and explain how the budget is used to attain each objective.

SOLUTION II.

Planning—Budgeting provides a forecast of the sales volume of the firm and an advance estimate of the needs of the business in terms of equipment, facilities, materials, labour and financing.

Co-Ordination—Production volume must have a logical relationship to sales volume. The engineering department must design a product that can be produced and sold at a competitive price. The sales effort must be gauged to the productive capacity and working capital available. By budgeting, imbalance between such variables can be prevented.

Control—The budget provides the proposed standard or yardstick against which actual results are judged. Variances of actual from budgeted indicate variances from the plan. When analyzed, such variances can lead to appropriate action in time to cut losses or make more effective use of resources. Thus budgeting enables management to control operations and to make more effective use of existing resources.

COMMENT:

This question was well answered and most students showed the three principal objectives as Planning, Co-ordination and Control. In some cases most of the individual points were listed and discussed without any, or only a hazy attempt at segregating the three principal objectives. The weakest area among the principal objectives was co-ordination.

PERSONALS

R. L. Sewell, 1st Vice-President of The Society of Industrial and Cost Accountants of Quebec, has been appointed Assistant Treasurer of Building Products Limited, Montreal. Mr. Sewell is a general member of the Montreal Chapter and a representative of the Montreal Chapter on the Dominion Board.

H. L. Llewellin, R.I.A., past Chairman of the Hamilton Chapter, has accepted a position as Chief Accountant and Office Manager with Lennox Industries (Canada) Ltd., Toronto. He was formerly with Aerovox Canada Ltd. in Hamilton.

W. E. Williams, R.I.A., formerly with Brown Boggs Foundry & Machine Co. Ltd., Hamilton, is now with Ready Mix Concrete (Hamilton) Ltd.

Jack Cummings, R.I.A., President of the Society of Industrial and Cost Accountants of British Columbia, has joined the Vancouver office of the Westcoast Transmission Company Limited.

Walter Nobbs, C.A., R.I.A., President of the Alberta Society, has been appointed a member of the Alberta Public Utilities Board in Edmonton.

H. C. Mekitiak, R.I.A., of the Calgary Chapter, has passed his final examinations for the degree of Chartered Accountant. Mr. Mekitiak is with the Dominion Income Tax office.

L. R. Bennett, R.I.A., of the Edmonton Chapter, has passed his final examinations for the degree of Chartered Accountant. Mr. Bennett is with Willetts, Berge, Bright & Co.